



# **Water Quality Approaches: Numeric Nutrient Criteria and State Nutrient Frameworks**

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# Today's Presentation

- Progress we have made on State Nutrient Frameworks
- Update on Numeric Nutrient Criteria
  - Approaches
  - State Progress
  - Bio-confirmation
- Looking Ahead



# EPA's Nutrient Reduction Framework

- EPA partners with States to accelerate reducing nitrogen and phosphorus pollution
- Goal: States develop numeric water quality standards on a reasonable schedule; but make progress on reducing loads in the near-term.



# EPA's Nutrient Reduction Framework

- **Recommended Elements of the Nutrient Framework:**
  - Prioritize watersheds and set load reduction goals
  - Effective source reduction: point source permits, storm water and septic systems, agricultural areas
  - Ensure accountability and report progress to public
  - Develop work plan for numeric criteria development

# Update: Nutrient Framework Support Hypoxia Task Force

- All 12 Hypoxia Task Force (HTF) states currently are developing their strategies and are in different stages of strategy development
- All have committed to complete state nutrient strategies by end of 2013
- Mississippi completed strategy development and is in implementation stage
- In FY 2011, EPA supplied \$1 Million to HTF states via Gulf of Mexico Program RFP to help address Nutrient Framework elements and support goals and actions of Mississippi River/Gulf of Mexico Watershed Nutrient Task Force.

# Update: State Nutrient Framework Support Nationwide

- This year EPA funded \$300,000 for technical assistance nationwide (12 states volunteered to accept assistance)
- All states are making progress on developing their frameworks
  - Most working on elements #1 watershed priorities, and #2 load reduction goals
  - Several working on other elements: #3 (point sources), #5 (storm water) , and #8 (criteria).
- EPA currently working with our 10 Regional offices to summarize status of all State nutrient reduction frameworks (early Fall, 2012)

# Some Examples of States' Nutrient Framework Development activities

1. Planning a series of meetings to develop and vet the draft statewide nutrient framework with key stakeholders.
2. Developing baseline economic impacts and associated fiscal and economic impact statements (FEIS/small business impacts) required as part of the state's rulemaking procedures to support adoption and implementation of numeric nutrient criteria
3. Assembling representative stakeholders and partners from a targeted group to establish a Nutrient Strategy Advisory Panel and to establish the Advisory Panel's charge to develop a strategy.

## Some Examples of States' Nutrient Framework Development Activities (cont.)

4. Refining approach aimed at implementing rural town stormwater/wastewater practices to achieve load reduction goals.
5. Identifying appropriate methods to model how nutrients and other parameters are contributing to the proliferation of hazardous algal blooms (HABs) across the state, as well as support the development of TMDLs or water quality management plans that will reduce the proliferation of HABs.
6. Evaluating associations between nutrient metrics and biological condition indices and deriving potential nutrient indicator threshold values.



# Developing Numeric Nutrient Criteria

- A critical piece of the framework is nutrient criteria
- Advantages of numeric nutrient criteria are many
- Multiple approaches are available, including:
  - Reference Condition
  - Stressor-Response Analysis
  - Classification of Waters
  - Mechanistic Models
  - Scientific Literature and Expert Judgment



# Nutrient Criteria

*Methods have different levels of complexity*

- Scientific literature

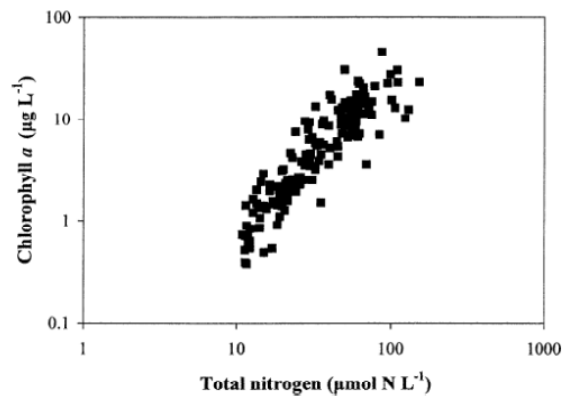


Fig. 1. Relationship between annual mean Chl *a* and annual mean TN concentrations in estuarine and coastal marine ecosystems.

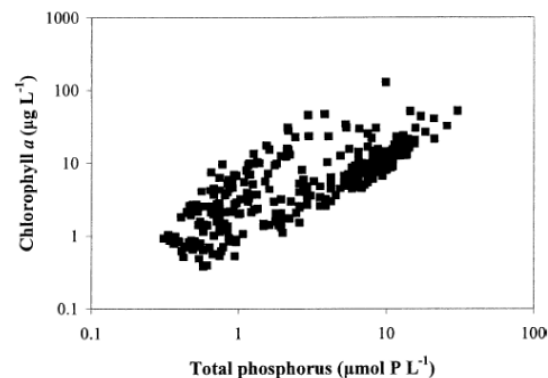
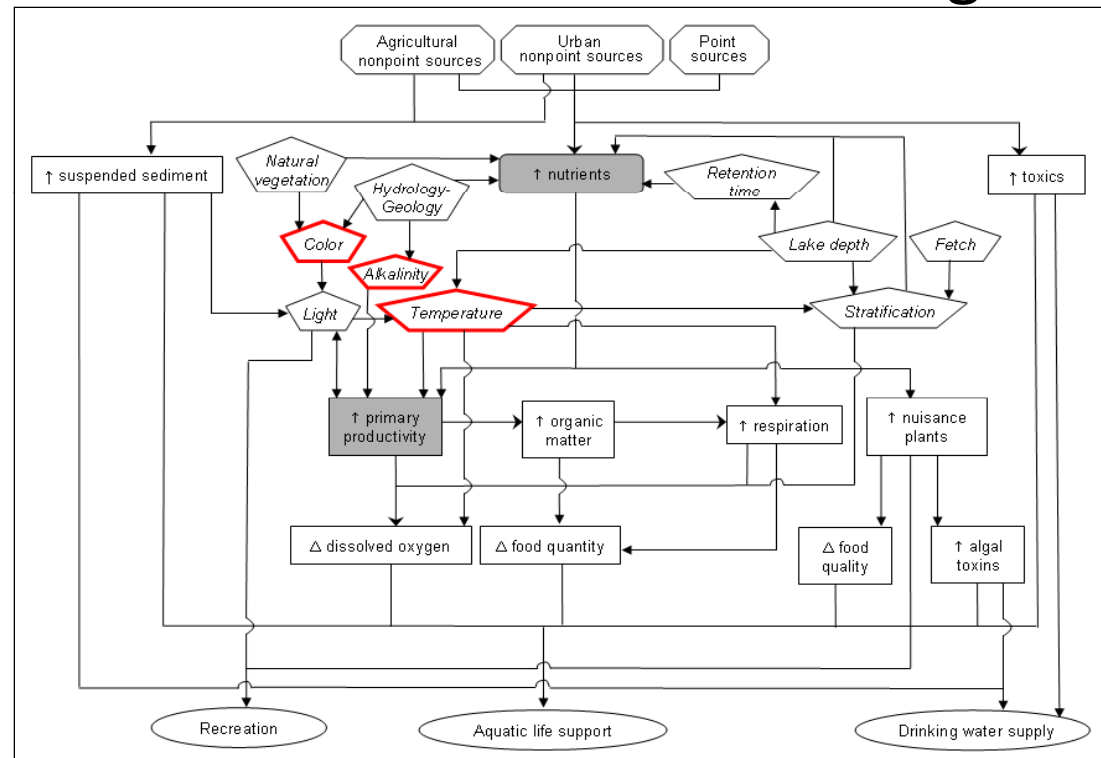


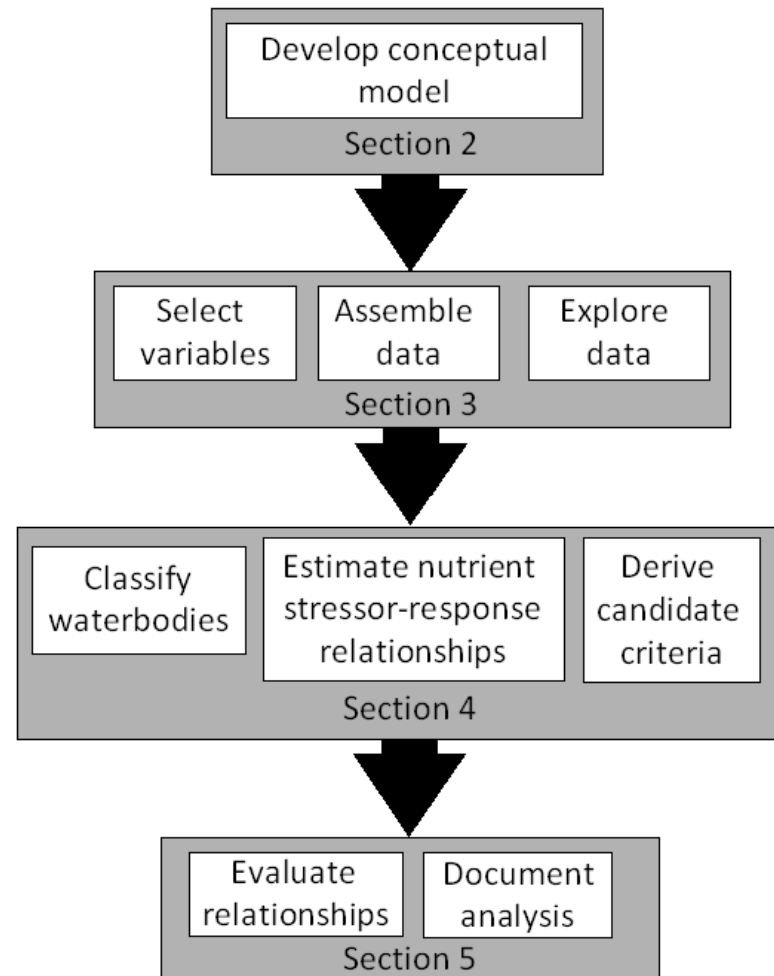
Fig. 2. Relationship between annual mean Chl *a* and annual mean TP concentrations in estuarine and coastal marine ecosystems.

- Mechanistic modeling

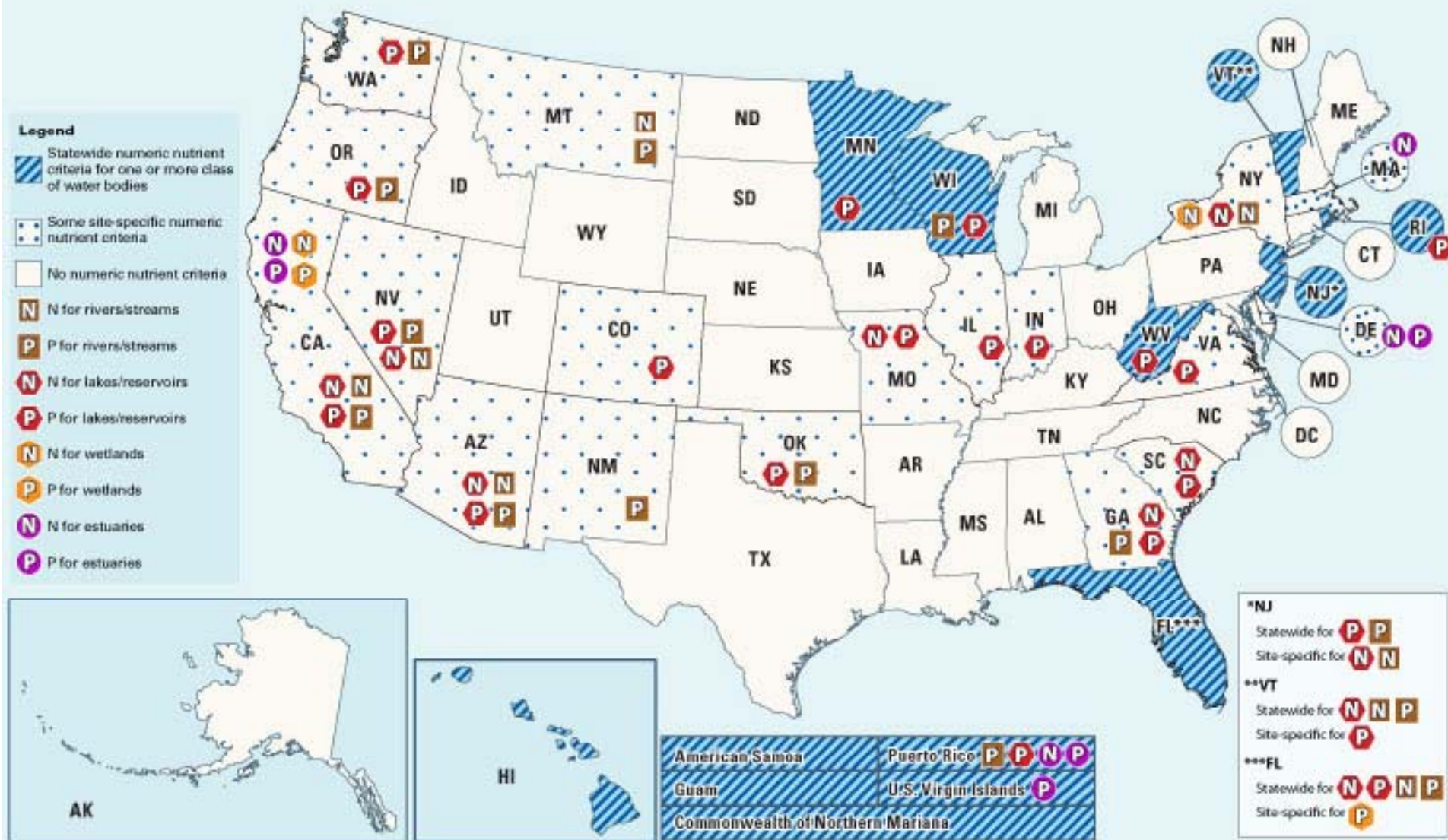


# Using Stressor-Response Relationships to Derive Numeric Nutrient Criteria

- Focuses on empirical approaches for determining stressor-response relationships.
- Four-step process for estimating and interpreting stressor-response relationships.
- Science Advisory Board review of draft document completed and final published in 2010.



# Progress Toward Clean Water Act Adopted Numeric Nutrient Criteria





# Nutrient Criteria Status

- **Numeric Nutrient Criteria**
  - 8 states have numeric P criteria for all waters within one or more classes of waters (i.e., rivers/streams, lakes/reservoirs, and estuaries)
  - 18 states have site specific numeric criteria for either N or P
  - 25 states have no numeric criteria for N or P (including Washington, DC)
- **Narrative Nutrient Criteria**
  - 19 states have narrative nutrient criteria that cover rivers/streams or lakes/reservoirs
  - 14 states have narrative nutrient criteria that cover estuaries

# Using Response Variables with Numeric Nutrient Criteria ("Biological Confirmation")

- Approach using one or more response variables instead of only exceedance of N and P criteria to determine nutrient impairment (e.g., biological index, chlorophyll *a*)
  - Nutrients themselves are not harmful to the system, but their effects can be
  - There can be variability and uncertainty between nutrient inputs and system responses
  - Biological responses can be measured and referenced over time in states with robust biomonitoring programs

# Using Response Variables with Numeric Nutrient Criteria (“Biological Confirmation”)

- Some concerns raised with relying only, or primarily, on response variables:
  - Confounding factors (e.g., light limitation) can mask or delay response to nutrients;
  - Relationship between a specific response parameter to nutrients may not be strong;
  - Nutrients may accumulate in the near-field and downstream, and the effects can also manifest away from the source;
  - Waiting for a harmful response to occur before taking action is not protective;
- A strong state bioassessment program may help to minimize or eliminate some of these concerns.

# Using Response Variables with Numeric Nutrient Criteria

## *Guiding Principles*

- EPA is developing a set of "guiding principles" to provide suggestions to states concerning what they might consider when developing nutrient criteria, for example:
  - Avoid conflict with EPA policy of independent application
  - Consider rigor of bioassessment program
  - Include a numeric expression of all causal and response parameters



## Nutrient Limits in NPDES Permits

- Where technology-based effluent limitations alone will not achieve applicable water quality standards, permitting authorities are required to include Water Quality-Based Effluent Limitation (WQBELs) in permits where it is determined that a pollutant will cause or have a reasonable potential to cause or contribute to an excursion of water quality standards.
- EPA is developing training to assist permit writers in the development of WQBELs for nutrients (2013).

# Looking Ahead

- A number of ongoing and new collaborative initiatives are underway at the national level, as well as in geographically targeted areas
  - Hypoxia Task Force
  - Mississippi River Basin Initiative
  - National Water Quality Initiative 2012 & 2013
  - Chesapeake Bay Watershed Initiative
  - Gulf of Mexico Initiative (GOMI)

## Looking Ahead (cont'd)


- State water quality agencies and USDA-NRCS work this year:
  - 2012 National Water Quality Initiative, target EQIP funds to selected watersheds
  - Identify watersheds for the Gulf of Mexico Initiative
- EPA and USDA have outlined a joint water quality initiative for FY13 to work together in 50 to 150 watersheds across the country.

# Looking Ahead – Key Priorities

- Working with more states to develop and implement nitrogen and phosphorus pollution reduction frameworks that address all sources of nutrient pollution
- Continued commitment to science
- Assistance with development of states' numeric nutrient standards
- Broader and more effective outreach to stakeholders

# Nutrient Pollution

## *Additional Resources Available*



United States Environmental Protection Agency

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## TECHNICAL RESOURCES



Visit EPA's site for [nutrient pollution policy and data](#).

<http://epa.gov/nutrientpollution/>

# Relevant EPA Websites

- **Nutrients Information, Policy and Technical Tools**

<http://epa.gov/nutrientpollution>

<http://epa.gov/nandppolicy>

- **Nitrogen and Phosphorus Pollution Data Access Tool**

<http://epa.gov/nandppolicy/index.html>

- **Gulf of Mexico Hypoxia Task Force**

<http://water.epa.gov/type/watersheds/named/msbasin/index.cfm>

- **Bioassessment and Biocriteria Program**

<http://water.epa.gov/scitech/swguidance/standards/criteria/aqlife/biocriteria/index.cfm>

- **NPDES Permit Writers' Manual**

[http://cfpub.epa.gov/npdes/writermanual.cfm?program\\_id=45](http://cfpub.epa.gov/npdes/writermanual.cfm?program_id=45)